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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

AKHAVANNIK, HUSSEIN

ART UNIT PAPER NUMBER

2621

DATE MAILED: 08/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/783,330

Applicant(s)

SIM, WOO-SUNG

Examiner

Hussein Akhavannik

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 3,4,6,8-19,22,23,25 and 27-38 is/are allowed.
- 6) ☒ Claim(s) 1,2,5,7,20,21,24 and 26 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 May 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Drawings

1. The drawings were received on May 27, 2004. These drawings are approved.

Priority

2. Receipt is acknowledged of papers submitted on June 10, 2004 under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Response to Arguments

3. Applicant's arguments filed May 27, 2004 have been fully considered but they are not persuasive.

The Applicant alleges on page 30, line 20 to page 31, line 13 of the Remarks (filed May 27, 2004) that it would not have been obvious to one of ordinary skill in the art at the time the invention was made to use the MAD values as disclosed by Lim et al in place of the SAD values of Park et al. The Examiner respectfully disagrees. The Examiner cited in paragraph 6 of the previous office action (mailed February 27, 2004) that it would have been obvious to one of ordinary skill in the art at the time the invention was made that MAD values are not as susceptible to noise as SAD values. This is inherently true because averaging multiple difference values will reduce the possibility of noise distorting the difference calculation (lower noise variance), resulting in the incorrect selection of a motion vector. Furthermore, SAD and MAD values are well known recognized art equivalents as explained by Chang et al (U.S. Patent No. 6,690,728) in column 3, lines 16-25. Chang et al also explains hierarchical motion estimation in column 4, lines 5-23. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute MAD values, as explained by Lim

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et al, for the SAD values used in the system of Park et al as both values are well known in the art to predict motion between two frames and the MAD values are not as susceptible to noise, thereby providing a more accurate difference value.

Allowable Subject Matter

4. Claims 3-4, 6, 8-19, 22-23, 25, and 27-38 are allowed.
5. The following is a statement of reasons for the indication of allowable subject matter:

The closest cited prior art (U.S. Patent No. 6,584,212) fails to teach or suggest the features of determining a first value based on a first predetermined relationship of the mean difference value of the new current search point and the mean difference value of a first neighboring search point, determining a second value based on a second predetermined relationship of the mean difference value of the new current search point and the mean difference value of a second neighboring search point, and performing motion estimation based in a first correlation between the first value and the second value as recited in independent claims 3 and 22. Claims 4, 6, 8-19, 23, 25, and 27-38 are also allowed for the same reason as stated above.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-2, 5, 7, 20-21, 24, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Park et al (U.S. Patent No. 6,584,212) in view of Lim et al (U.S. Patent No. 6,332,002).

Referring to claim 1, which is representative of claim 20,

- i. Calculating respective mean difference values for a current search point of a search block and neighboring search points within the search block is not explicitly explained by Park et al. Park et al illustrate in figure 1 and explain in column 1, lines 49-54 that difference values for a current search point of a search block and neighboring search points within the search block are calculated. Park et al explain that Sum of Absolute Differences (SAD, as explained in column 2, lines 36-47), corresponding to mean difference values, are calculated for the central search point (at location (0,0)) and each of its neighboring search points, indicated by dark-filled circles. However, Park et al do not explain that mean difference values are used, but rather explain using SAD values. Lim et al explain that mean absolute difference (MAD) values may be used to determine the difference between a search point in a current frame and it corresponding point in a subsequent frame in column 4, lines 11-25. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute MAD values, as explained by Lim et al, for the SAD values used in the system of Park et al as both values are well known in the art to predict motion between two frames and the MAD values are not as susceptible to noise, thereby providing a more accurate difference value.
- ii. Performing motion estimation around the current search point if the mean difference value of the current search point is smaller than the mean difference values of the neighboring search points is explained by Park et al in column 1, lines 49-54 and

column 2, lines 1-3. Park et al explain that if the central search point has the minimum SAD, then the algorithm skips to step 4, wherein the final motion vector is selected.

iii. Performing motion estimation based on the mean difference values of at least some of the neighboring search points if the mean difference value of the current search point is not smaller than the mean difference values of at least one of the neighboring search points is explained by Park et al in column 1, lines 55-64 and illustrated in figure 1. If one of the neighboring search points has a SAD lower than the central (or current) search point, then the neighboring search point with the lowest SAD is chosen as the next central search point. In figure 1, Park et al illustrate two possibilities of new central search points at locations (0,-2) or (-2,2).

Referring to claim 2, which is representative of claim 21,

i. Determining a first predetermined number of first search points disposed a first predetermined pixel distance from the current search point, wherein the first search points and the current search point form a first group of points is illustrated by Park et al in figure 1. The original central search point, at location (0,0), is grouped together by its eight neighboring pixels located a predetermined distance of 2 pixels away. All of the pixels in the first group are identified by dark-filled circles.

ii. Determining respective mean difference values of the first search points is explained by Park et al in column 2, lines 36-47, wherein the SAD for each point in the first group (corresponding to “nine search locations”) is calculated.

iii. Selecting a motion vector point from among the first group of points, wherein the motion vector point has a smallest mean difference value of the first group of points is

illustrated by Park et al in figure 1 and explained in column 1, lines 55-64. Two examples of points with the lowest SAD values are illustrates at locations (0,-2) or (-2,2). The motion vector for each of the points is clearly illustrated by the arrows originating from the central point.

iv. The motion vector point defining a displacement vector estimating motion is explained by Park et al in column 2, lines 1-3 and illustrated in figure 1. The motion vector point defines the end point of the motion vector illustrated by Park et al.

Referring to claims 5 and 7, which are representative of claims 24 and 26, the mean difference values being mean absolute difference values corresponds to claim 1i, wherein the system of Park et al and Lim et al uses MAD values to determine the difference value for every search point.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hussein Akhavannik whose telephone number is (703)306-4049. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo H. Boudreau can be reached on (703)305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hussein Akhavannik
July 30, 2004

H.A.


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